

Population Health Stats Review

P-Value: How compatible the data is with the null hypothesis

$P \leq H_0$ reject null hypothesis

$P \geq H_0$ fail to reject the null hypothesis

P-values are not just a function of the data, they also are a reflection of the sample size

α : Level of Significance

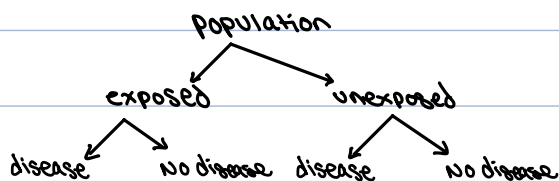
~5% or 0.05 *Willing to falsely reject H_0 1/20 times

Type I error $\rightarrow$ False Positive

Type II error $\rightarrow$ False Negative

Confidence Interval: $(1 - \alpha)\%$. Confident that the confidence interval contains the true population measure

Cohort Study



	Exposed	unexposed
Disease	A	B
No disease	c	D

$\rightarrow$ Disease odds ratio

Prob DS/exposure $\div$ Prob DS/ $\overline{\text{exposure}}$
 $1 - P(DS|Exp)$ $\div$ $1 - P(DS|\overline{Exp})$

$$\frac{\frac{A}{A+C}}{\frac{c}{A+C}} \div \frac{\frac{B}{B+D}}{\frac{D}{B+D}} \Rightarrow \frac{A/C}{B/D} = \frac{AD}{BC} *$$

	Exposed	unexposed
Disease	A	B
No disease	c	D

Risk of disease in exposed $\frac{A}{A+C}$
 Risk of disease in unexposed $\frac{B}{B+D}$

Relative Risk $\frac{\frac{A}{A+C}}{\frac{B}{B+D}}$

exposure odds ratio same as disease odds ratio

	Small #	Exp	$\overline{Exp}$
rare disease DS	5	A	1B
$\overline{DS}$	50	c	75D

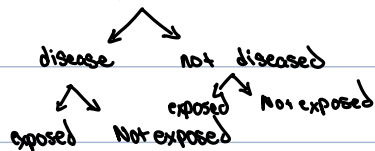
$$\frac{5/55}{1/76} = \frac{0.09}{0.013} = 6.9 \text{ risk ratio} \quad \frac{5(75)}{50} = 7.5 \text{ odds ratio}$$

RR and OR $\approx$ rare disease

close enough? "rare disease assumpt."

Case Control Study

- Population ← need to know!



	exp	$\bar{\text{exp}}$
DS	A	B
$\bar{\text{DS}}$	C	D

Can't do risk ratio in a case control study!

Probability of exposure given disease

$$\frac{\text{Prob (exp/disease)}}{(1 - P_{\text{exposure} | \text{Disease}})} = \text{odds exposure given disease}$$

$$\frac{\text{Prob (exp/\bar{DS})}}{1 - \text{Prob (exp/\bar{DS})}} = \text{odds exposure given non disease}$$

Exposure odds ratio!

	exp	$\bar{\text{exp}}$
DS	50	25
$\bar{\text{DS}}$	50	75

$$\frac{A}{A+B} / \frac{B}{A+B} = \frac{50/75}{25/75}$$

$$\frac{\text{Prob (exp/disease)}}{(1 - P_{\text{exposure} | \text{Disease}})} = \text{odds exposure given disease}$$

$$\frac{\text{Prob (exp/\bar{DS})}}{1 - \text{Prob (exp/\bar{DS})}} = \text{odds exposure given non disease}$$

Exposure odds ratio!

odds ratio = 3